College Preparatory Mathematics (CPM)
Geometry Connections, Geometry

Degree of Evidence regarding the Standards for Mathematical Practice:

Limited evidence

Summary of evidence:

1. **Make sense of problems and persevere in solving them**. There are many open-ended problems presented throughout the text. In the chapters reviewed, there are few opportunities to establish connections among tables, graphs, equations, and situations. (One such opportunity is found on p. 594 in 12-62 and on p. 454 in 9-35.) Students are directed to explain their findings regularly in groups and in a "Learning Log", or math journal (e.g. p.159 exercise 3-58), but it would be up to the teacher to facilitate these opportunities to explain and analyze. There are opportunities for reflection at the end of each chapter in the Closure sections (p.176-181) and could be easily skipped. It would be up to the teacher to implement the activities for reflection. Overall, there are frequent opportunities for students to tackle problems on their own, though the text seems to lack a variety of open-ended problems. There are many opportunities for students to create a problem-solving plan and follow through as well as to determine reasonableness. Teacher implementation of the activities would be crucial to the development of explanations and analysis.
2. **Reason abstractly and quantitatively**. In the chapters reviewed, there are many application problems ingrained within each chapter. Appropriate units are frequently used in the problems. The students are often directed to create a model to represent the problem situation, whether with technology or hands-on manipulatives. Connections between applications and the representation using symbols are present. Most questions are solved by applying an algorithm that the students have generalized for themselves through the discovery investigations.
3. **Construct viable arguments and critique the reasoning of others**. There are opportunities for students to explain their reasoning. Exercises frequently require students to justify their answers. In the chapters reviewed, students are constantly directed to share ideas within their cooperative learning team and to then be prepared to share their findings with the class. The teacher could then facilitate a discussion requiring students to critique each other's reasoning. Explanations and discussion of justification are present in the chapters reviewed. The teacher resource also details strategies to facilitate the discussion as well as to help teachers anticipate common misconceptions. There are frequent opportunities for students to justify their thinking in writing. Opportunities for discussion will rely on teacher facilitation of the activities and practice problems.
4. **Model with mathematics**. Students are frequently directed to create a model. (e.g. Sections 6.2.1-6.2.5 have students incorporate previous tools and strategies to model the mathematics present in problem scenarios.) In the application questions, answers are in context. Students have some opportunity to work with tables and equations in the student resource, but it seems that the exposure to modeling relies heavily on the resource pages included in the teacher notebook for duplication. The applications are more in the form of a closed word problem rather than being open-ended. Overall, there are some opportunities for students to create mathematical models, but these opportunities depend on teacher implementation and the incorporation of the resource pages.
5. **Use appropriate tools strategically.** Geometric constructions are interspersed at various times in the text, but do not seem to be presented as a tool to help students make sense of additional mathematical concepts. Students are asked to use rulers, protractors, technology, and other hands-

on materials to help them in the exploration of concepts through the investigations. It would be up to the teacher to include these investigations in the course to help students grapple with various tools, since the practice problems are few and tend to just review previous concepts (e.g. p.472). There is limited reference to the use of graphing calculators aside from with trigonometry (e.g. p.243). The use of technology is suggested, but this text does not seem to advocate for technology over other methods like hands-on manipulatives. Overall, there is the potential for technology use, but it would be up to the teacher to incorporate. Concepts are presented for investigation, but it seems the investigations are not extensive enough to build on prior learning and guarantee student mastery of the new concept. Geometric constructions seem to be taught as an extra concept rather than as a tool for understanding geometry. There is some evaluation of which tools or strategies will be best to use in the given problem situation.

6. **Attend to precision.** Examples use proper notation and are precise. In the chapters reviewed, examples of precise communication are not present. Students are given opportunities to share and discuss their responses when completing investigations, but it would depend on implementation by the teacher. There is attention to precision in the examples, but no examples of precise communication for students to analyze. The fostering of precise communication relies on teacher facilitation of the student investigations.
7. **Look for and make use of structure**. In the chapters reviewed, there are many opportunities for students to look at examples and then to generalize the mathematical rule or truth. Every lesson is organized with several problems for students to investigate and complete on their own, deriving the mathematical rules and concepts on their own. Every lesson has students go back and review past learning, but there is little opportunity to practice the current concepts. Practice over the current concepts being learned would require the purchase of the student workbook in addition to the student textbook. There are many opportunities for students to generalize their thoughts, within the "Learning Log" and the class discussions, if implemented by the teacher.
8. **Look for and express regularity in repeated reasoning.** In the chapters reviewed, students are rarely, if ever, asked to look at patterns and generalize on their own. Most of the time, the book shows them the pattern and then provides the formula (e.g. p.383 with Polygon Angle Sum Theorem). Students are asked to generalize patterns to make shortcuts, as seen with the special right triangle relationships presented on pp.250-251. Overall, there are many opportunities for students to generalize a pattern to determine a rule. Opportunities to meet this standard would depend on the teacher taking the initiative to incorporate the investigations in to the course.